

HYPOLIPIDEMIC EFFECT OF *ALPINIA GALANGA* (Rasna) AND *KAEMPFERIA GALANGA* (Kachoori)

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ABSTRACT

The rhizome of both *Alpinia galanga* and *Kaempferia galanga* are widely used in the Ayurvedic system of medicine in the treatment of various inflammatory diseases, diabetes mellitus and obesity. Present study evaluated the hypolipidemic action of the ethanolic extract of these plants *in vivo*. The oral administration of the extracts (20 mg/day) of both *A. galanga* and *K. galanga* effectively lowered the serum and tissue levels of total cholesterol, triglycerides, phospholipids and significantly increased the serum levels of high density lipoproteins (HDL) in high cholesterol fed white wistar rats over a period of 4 weeks. The results are indicative of these plants in various lipid disorders especially atherosclerosis.

KEY WORDS : Hypolipidemic effect, *Alpinia galanga*, *Kaempferia galanga*

INTRODUCTION

Hyperlipidemia associated lipid disorders are considered to cause atherosclerotic cardiovascular disease and cerebrovascular disease (1,2). Among these hypercholesterolaemia and hypertriglyceridemia are closely related to ischemic heart disease (3,4,5). In addition to these primary risk factors, others such as cigarette smoking, diabetes mellitus, alcoholism are to be managed well. Though diet control and proper exercise are recommended, an effective lipid lowering therapy is well warranted. Most of the existing lipid lowering drugs like cholesteryl amine, colestipal, clofibrate, gemfibrozil, lovastatin etc. are having various side effects (6). Hence a long term therapeutic usage of these drugs are not recommended.

A large number of medicinal plants are tried on this aspect. *Commiphora wightii* (7), *Allium sativum*, *Allium sepa* (8), *Curcuma longa* (9), *Ficus bengalensis* (10) and *Trigonella foenum graecum* (11) are found to be lipid lowering.

The plants *Alpinia galanga* (Rasna) and *Kaempferia galanga* (Kachoori) belong to the family Zingiberaceae and are widely used in the Ayurvedic

system of medicine. The various ingredients of 'Lodrasavam', 'Kachooradi choornam', 'Rasna panchakam' etc. contain the dried powder of their rhizomes and are used against various inflammatory diseases (12), Meda roga (lipid disorders) (13) and Pramehatus (14) (Diabetes mellitus). These are also reported to be having anti-oxidant (15), anti-inflammatory (16), anti-ulcerous (17) and anti-tumour (18) activities. The present study evaluates the lipid lowering activity of an ethanolic extract of *A. galanga* and *K. galanga*.

MATERIALS AND METHODS

Drug preparation

Dried powder of the rhizome of *A. galanga* as well as *K. galanga* was extracted twice with 70% ethanol (1:10 w/v) by stirring overnight. It was then centrifuged at 1000 r.p.m. for 30 min. The supernatants of the extracts were then pooled, evaporated and residue was dissolved in very small quantity of 70% ethanol, diluted to a known volume with distilled water and used as drug.

Adult male wistar rats supplied by small animals breeding station, Veterinary College, Thrissur were used for the experiments. They were fed with normal

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Table 1: Levels of lipids in the serum.

	Normal (A)	HFD alone Control (B)	High fat diet+Drug mg / animal / day			
			Alpinia 10	Galanga 20	Kaempferia 10	galanga 20
Weight of animal						
in gms. initial	110	121	120	110	120	120
Final	176	216	200	183.3	176.6	170
Total Cholesterol (mg/dl)	57.1±0.38	139.2±0.52	92.8±0.44**	49.8±0.11**	108.1±0.42*	72.4±0.23**
HDL Cholesterol (mg/dl)	31.3±0.67	16.0±0.73	23.5±0.35**	26.5±0.39**	21.2±0.14**	24.4±0.54**
Triglyceride (mg/dl)	30.4±0.52	94.9±0.57	72.4±0.55	57.5±0.29**	30.2±0.30**	22.4±0.17**
Phospholipid (mg/dl)	161.8±1.37	388.5±2.94	362.4±1.41	219.4±1.38	277.7±2.01*	197.7±1.13**

** P<0.001. Values are Mean +S.D. of 6 animals.

* P<05

rat feed and water ad libitum. 24 animals were divided into 4 groups A, B, C and D of 6 each. The group A was maintained as normal. The groups B, C and D received high fat high cholesterol diet (H.F.D.) of the following composition (19). Bengal gram 30 gm, sucrose 25 gm, milk powder 16 gm, salt mixture 4 gm, yeast 1 gm, shark liver oil 2 gm, hydrogenated ground nut oil 10 gm and cholesterol 5 gm per 100 gm diet. Among these group B was untreated. The group C animals were given 10 mg and 20 mg extracts of *A. galanga* and group D were given similar doses of *K. galanga* extract orally per day simultaneously with H.F.D. for a period of one month.

At the end of experimental period all the animals were fasted over night and sacrificed on the next day. Liver was weighed. The total cholesterol, HDL cholesterol (20), triglycerides (21) and phospholipids (22) of both serum and liver were estimated.

RESULTS

Two different concentrations (10 mg and 20 mg) of *A. galanga* and *K. galanga* extracts showed significant hypolipidemic activity in a dose dependent manner. The maximum activity was at the dose 20 mg/day/animal.

An elevation of various lipids levels in the

serum and liver tissue were observed in the control group (group B) which was fed high fat high cholesterol diet compared to normal (group A) whereas in the treated groups (C, D) considerable reduction was noticed.

As shown in the table I the administration of 20 mg *A. galanga* and *K. galanga* significantly lowered the level of serum total cholesterol from 139.23 mg/dl to 49.81 mg/dl (P<0.001) and 72.45 mg/dl (P<0.001) respectively.

The serum triglyceride level in the control group was 94.95 mg/dl whereas in the case of *A. galanga* treated group it was 57.49 mg/dl and in the *K. galanga* treated group 22.45 mg/dl.

Administration of 20 mg extract of *A. galanga* and *K. galanga* also had significant effect (P<0.001) on serum phospholipid levels. The maximum activity was observed in the 20 mg *K. galanga* treated group, in which the reduction was from 388.49 mg/dl to 197.7 mg/dl. *A. galanga* could lower the level to 219.42 mg/dl.

In addition, the serum HDL levels in both *A. galanga* and *K. galanga* treated groups were found to be increased considerably. From the control value i.e. 16.04 mg/dl the level increased to 26.54 mg/dl and 24.4 mg/dl by the 20 mg extract of *A. galanga* and *K. galanga* respectively.

Table 2: Levels of lipids in the liver tissue (mg/gm tissue)

	Normal (A)	Control H.F.D. Alone (B)	High Fat Diet + Drug mg / animal / day			
			A. galanga (C)	K. galanga (D)		
			10	20	10	20
Total	2.14 ±	3.98 ±	3.48 ±	3.11 ±	3.59 ±	3.16 ±
Cholesterol	1.20	2.22	1.90	1.74	2.01	1.80
Triglycerides	2.83 ±	5.00 ±	4.96 ±	4.70 ±	4.96 ±	4.15 ±
	1.89	2.97	2.77	2.63	2.35	2.76
Phospholipids	1.23 ±	1.58 ±	1.33 ±	1.13 ±	1.56 ±	1.21 ±
	0.69	0.85	0.77	0.58	0.07	0.55

The tissue levels of lipids were also found to be increased in control group (Table 2). The administration of 20 mg of *A. galanga* and *K. galanga* reduced the total liver cholesterol, triglycerides and phospholipids when compared to control group animals. The total liver cholesterol level in the control group was 3.98 mg/gm tissue. In the *A. galanga* treated group it was reduced to 3.11 mg/gm tissue and in *K. galanga* treated group the reduced level was 3.16 mg/gm tissue. The liver triglyceride level was not much controlled by the two extracts though 20 mg of *A. galanga* and *K. galanga* lowered the tissue levels of triglycerides to 4.70 mg/gm tissue and 4.15 mg/gm tissue respectively compared to control groups in which the T.G. level was 5.00 mg/gm tissue. The normal liver phospholipid level was 1.23

mg/gm tissue and in the control group the level increased to 1.58 mg/gm tissue. The administration of 20 mg *A. galanga* and *K. galanga* brought the level almost equal to normal i.e. 1.13 mg/gm tissue and 1.21 mg/gm tissue respectively.

DISCUSSION

Our results indicate that *K. galanga* and *A. galanga* are effective in lowering serum levels of lipids where as no significant effect was observed in the liver tissue. Moreover serum HDL level shows significant increase in the treated group compared to untreated control. These observations suggest a possible role of these drugs against various lipid disorders, a risk factor for atherosclerotic cardiovascular diseases and other arteriovascular diseases.

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